EMS Annual Meeting Abstracts
Vol. 19, EMS2022-679, 2022
https://doi.org/10.5194/ems2022-679
EMS Annual Meeting 2022

Communicating uncertainties for flood warning in small catchments using ensemble hydrological forecasting

Jens Grundmann[1], Achim Six[2], and Andy Philipp[2]
[1]TU Dresden, Institute of Hydrology and Meteorology, Dresden, Germany (jens.grundmann@tu-dresden.de)
[2]Saxon Flood Forecasting Centre, Saxon State Office for Environment, Agriculture and Geology, Dresden, Germany

Reliable warnings and forecasts of extreme precipitation and resulting floods are important for disaster mangers to initiate flood defence measures. Thus, disaster managers are interested in extended lead times, which can be obtained by employing forecast of numerical weather models as driving data for hydrological models. Especially for small catchments, warning and forecasting systems are challenging due to the short response time of the catchments and the uncertainty of meteorological forecasts. To portray the inherent uncertainty of weather model output, ensemble hydro-meteorological forecasts can be used.

By this contribution, we present our operational web-based demonstration platform for ensemble hydrological forecasting in small catchments of Saxony, Germany (http://howa-innovativ.hydro.tu-dresden.de/WebDemoLive/). We use the ICON/COSMO-D2-EPS product of the German Weather Service (DWD), which provides an ensemble of 20 members each three hours.

Each member is evaluated regarding specific extreme precipitation thresholds for predefined hydrological warning regions. If these thresholds are exceeded in a specific region, rainfall-runoff models for the associated catchments are started to propagate the meteorological uncertainty into the resulting runoff, followed by statistical post processing and visualization. Forecasts are updated each hour if new precipitation observations by the radar product RADOLAN-RW of the DWD is available and they are processed for lead times up to 27 hours.

Different options for the visualization of the uncertainty information in precipitation and resulting runoff were discussed and evaluated by a series of workshops with locally responsible civil protection forces and water authorities. This leads to the current design of the web-based demonstration platform in an iterative process.

The web-based demonstration platform is established for three pilot regions with different hydrological settings in Saxony, Germany. Besides layout and technical issues, results and experiences with the demonstration platform are presented for observed extreme events in the small pilot regions in 2018 and 2021.